Dominated Strategies & Iterative Removal: An Application

Game Theory Course:
Jackson, Leyton-Brown & Shoham

Feeting Behavior among Pigs and Iterative Strict Dominance

- Experiment by B.A. Baldwin and G.B. Meese (1979) "Social Behavior in Pigs Studied by Means of Operant Conditioning," *Animal Behavior*, Vol 27, pp 947-957. (See also J. Harrington (2011) *Games, Strategies and Decision Making*, Worth Publishers.)

- Two pigs in a cage, one is larger: "dominant" (sorry for the terminology...)

- need to press a lever to get food to arrive

- food and lever are at opposite sides of cage

- run to press and the other pig gets the food...

Game
Theory
Online
cooperative payoff utility
Bayesian Normal-form auctions
tragedy of the commons
equilibrium class
Nash
predator
strategies random math
zero-sum probability

10 units of food - the typical split:

- if large gets to food first then 1,9 split (1 for small, 9 for large),

- if small gets to food first then 4, 6 split,

- if get to food at the same time then 3,7 split

- Pressing the lever costs 2 units of food in energy

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$Small/Large$	$Press$	$Wait$
$Press$	$1, 5$	$-1, 9$
$Wait$	$4, 4$	$0, 0$

Let us solve via iterative elimination of strictly dominated strategies:

$Small/Large$	$Press$	$Wait$
$Press$	$1, 5$	$-1, 9$
$Wait$	$4, 4$	$0, 0$

Pigs Behavior: Frequency of pushing the lever per 15 minutes, after ten tests (learning...) Baldwin and Meese (1979)

	Alone	_Together_
LargePigs	75	105
SmallPigs	70	5

Iterative Strict Dominance

- Are pigs rational? Do they know game theory?

- They do seem to learn and respond to incentives

- Learn not to play a strictly dominated strategy...

- Learn to not to play strictly dominated strategies out of what remains...

- Learning, evolution, and survival of the fittest: powerful game theory tools.